TECHNICAL REPORT DOCUMENTATION PAGE

1 Report No. RDT 99-001	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Temperature-Dependent Performance of Polymer Concrete Wearing Surface System on the Poplar Street Bridge		5. Report Date January 1999 6. Performing Organization Code UMC
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9. Performing Organization Name and Address The Curators of the University of Missouri Office of Sponsored Program Administration 310 Jesse Hall Columbia, MO 65211		10. Work Unit No. 11. Contract or Grant No.
12. Sponsoring Agency Name and Address Missouri Department of Transportation Research, Development and Technology Division P.O.Box270 Jefferson City, MO 65102		13. Type of Report and Period Covered Final Report 14. Sponsoring Agency Code MoDOT

15. Supplementary Notes
The investigation was conducted in cooperation ,with the U. S. Department of Transportation, Federal Highway Administration.

16. Abstract
The report details a five-year study of the performance of the epoxy (polymer) concrete wearing surface placed on the orthotropic steel-plate deck of the Poplar Street Bridge in St. Louis, Missouri. This study involved inspections, field testing and laboratory experiments and analyses. During the first few years, the focus was on the field study components. Later when some cracks were observed on the wearing surface, a detailed experimental and analytical investigation was incorporated to understand the cause of the cracks and study potential crack-repair procedures. Laboratory experiments were undertaken to study the temperature-dependent mechanical properties of the polymer concrete materials used on the bridge deck. Experiments included a series of static flexural tests, axial compression tests and flexural fatigue tests on the polymer concrete specimens under three different test temperatures. Temperature-dependent mechanical properties such as modulus of rupture, compressive strength, modulus of elasticity and fatigue strength were obtained from the tests. The analyses components focussed on the reasons for longitudinal fatigue cracking and transverse wearing surface cracking. It has been shown that a combination of traffic loads resulting in transverse bending of the deck plate and cold temperatures contribute to the longitudinal fatigue cracking observed on the deck. Transverse cracking of the wearing surface in the thickness transition zone of the eastbound lanes has been attributed to differential thermal expansion of the two webs of the south box girder coupled with thermal and elastic mismatch between the wearing surface and the steel deck plate. It has been concluded that temporary repair of wearing surface cracks using Pavon (asphalt-based product) or NRVL4, sealant would minimize potential water infiltration onto the steel deck and extend the life of the wearing surface. An alternate repair approach where SIMCON (Slurry infiltrated steel fiber mat reinforced concrete) plates are bonded to the wearing surface holds promise as a long-term solution.

17. Key Words Polymer concrete, Bridge deck, orthotropic steel-plate deck	18. Distribution Statement No restrictions. This document is available to the public through National Technical Information Center, Springfield, Virginia 22161		
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. No. of Pages 12	22. Price

Form DOT F 1700.7 (06/98)